

ACADEMIC PHARMACY SECTION SPECIAL ISSUE

DESCRIPTIVE REPORT

Training Nigerian pharmacy interns for leadership and clinical pharmacy advancement using the ADDIE method of instructional design

Ucheoma Nwizu¹ , Comfort Nanbam Sariem² , Jodie Malhotra³ 

¹ Pharmacy Department, Neighborhood Health Center, Milwaukie, Oregon, United States

² Department of Clinical Pharmacy and Pharmacy Practice, Faculty of Pharmaceutical Sciences, University of Jos, Jos, Nigeria

³ Department of Clinical Pharmacy, University of Colorado Skaggs School of Pharmacy and Pharmaceutical Sciences, Colorado, United States

Keywords

ADDIE model
Clinical pharmacy
Kirkpatrick's evaluation method
Leadership

Correspondence

Ucheoma Nwizu
Pharmacy Department
Neighborhood Health Center
Milwaukie
Oregon
United States
ucheomanwizu@yahoo.com

Abstract

Background: Leadership skills are required to promote and advance clinical pharmacy practice in Nigeria. The Nigerian pharmacy curriculum does not include any modules or training in leadership. **Objective:** A twelve-month online training on leadership and clinical pharmacy improvement was designed and delivered to intern pharmacists in Nigeria using the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) method of instructional design. The goal was to train interns to demonstrate leadership skills by identifying gaps in patient care or medication use processes at their practice sites and developing projects to solve them. **Method:** The Kirkpatrick's four-level method of training evaluation was used to assess the training. **Result:** About 42% of participants completed the training with the required capstone project. **Conclusion:** This paper describes the implementation and evaluation of a yearlong training designed to provide pharmacy interns in Nigeria with the necessary leadership skills to advance the field of clinical pharmacy.

Introduction

A leader is anyone who takes responsibility for finding the potential in people and processes and has the courage to develop that potential (Brown, 2018). Leadership has been identified as one of the ways to create agents of change for pharmacy and society (Kerr *et al.*, 2009). The American Society of Health-System Pharmacists (ASHP) issued a position statement in 2011 describing leadership as a professional obligation of all pharmacists and not the exclusive responsibility of pharmacists who hold formal leadership positions or titles. Leadership was included in the Accreditation Council on Pharmacy Education (ACPE) Standards and the Center for the Advancement of Pharmacy Education (CAPE) educational outcomes (Medina *et al.*, 2013; Accreditation Council for Pharmacy Education, 2015). As a result, there has been an increasing expectation that pharmacy educators prepare students

to become leaders, and colleges of pharmacy in the United States have added leadership to the didactic and/or experiential content of their programmes (Brittain *et al.*, 2019).

Leadership skills are required to promote and advance clinical pharmacy practice in Nigeria. Although more pharmacy schools in Nigeria are adopting the PharmD programme, pharmacy curricula do not include leadership courses (National Universities Commission, 2007). The mandatory twelve-month internship that follows graduation from pharmacy school includes experiences in prescription validation, dispensing, medicine management, drug information, and pharmacy management but does not incorporate any formal leadership training (Pharmacists Council of Nigeria, 2014). Clinical pharmacy practice in Nigeria is still underdeveloped, and studies have shown that it merely consists of patient education and counselling,

with a limited number of pharmacists routinely involved in multidisciplinary ward rounds, therapeutic guidelines development, antibiotic stewardship programmes, and drug therapy monitoring (Auta, Strickland-Hodge & Maz, 2016; Udoh *et al.*, 2021,). The one-year internship period provides an opportunity to train recently graduated pharmacists in skills needed to scale up clinical pharmacy practice.

The Analysis, Design, Development, Implementation, and Evaluation (ADDIE) model of instructional design was used to provide training for pharmacy interns to expand clinical pharmacy practices in their internship sites. The ADDIE method employs a systematic process to determine the necessary knowledge or skills to be acquired, establish goals and objectives, and create a strategic plan to achieve those goals and objectives to meet the training needs. The ADDIE model was initially used to assess military training during World War II and has since evolved as an iterative process to analyse and evaluate effectiveness in training (Allen, 2006). It has since been embraced by the distance education community for its ability to standardise educational experiences and has been successfully used to provide instruction and learning for health professionals, including nurses, physicians, and pharmacists (Battles, 2006; Pittenger *et al.*, 2009; Almomen *et al.*, 2016).

Methods

Twelve recent pharmacy graduates (also known as pharmacy interns) received training from October 2019 to October 2020. To be eligible for the programme, participants had to have a cumulative Grade Point Average (GPA) of at least 2.5 out of 5.0, perform above average during the internship placement interview, and demonstrate high academic self-efficacy.

These pharmacy graduates were practising in four different tertiary hospitals located in Northern and Midwestern Nigeria, with bed capacities ranging from 180 to 600. Pharmacists in these hospitals had mainly medication distribution roles. On one of the hospital's web pages, a list of healthcare teams, which included doctors, nurses, dieticians, social workers, and physiotherapists, did not list pharmacists as members of this team. Clinical pharmacy practice in these hospitals is limited to pharmacovigilance (adverse event reporting) and medication therapy management. Other activities include compounding, drug information service, and supply chain management. This training was designed using the ADDIE model of instructional design.

Analysis

The goal was to collect information on interns' baseline knowledge, skills, and attitudes regarding leadership and clinical pharmacy advancement in Nigeria to determine what should be included in the curriculum. To achieve this goal, the authors surveyed the participants and reviewed the current Nigerian pharmacy curriculum and the internship manual to identify learning gaps. Additionally, the authors analysed training site and preceptor needs, including the availability of preceptors, their willingness to participate in this yearlong internship, and pharmacists' access to patient information, to determine the resources needed for the successful completion of this training programme. Participating sites were required to allow pharmacists to access patient clinical data.

Design

During the design phase, the goals and learning objectives for training were identified, and a blueprint consisting of curriculum and delivery methods was created. The curriculum was designed based on the learning gaps identified in the analysis phase and the predetermined goals of the training. It comprised six online modules designed to run for a duration of four to six weeks, culminating in a capstone project. Modules taught online included the history of clinical pharmacy advancement in the United States, process improvement, project management, leadership, and personal and interpersonal leadership. The modules were delivered via asynchronous online courses using a multimedia approach, including pre-recorded video presentations, Zoom and Skype meetings, threaded discussions, and informal discussions on group chat platforms as deemed necessary.

The authors met with the facilitators to determine the content of the modules, learning strategies, evaluation, and teaching methods, based on the objectives. Each facilitator was provided with tools for module planning and course alignment. Facilitators included volunteer lecturers from the Skaggs School of Pharmacy, University of Colorado, Aurora Colorado, University of Jos, Plateau State Nigeria, and practising clinical pharmacists from the United States and Nigeria, all of whom volunteered their time. Preceptors were chosen from the different practice sites based on expressed interest and availability.

Development

The development phase of the ADDIE model begins with the production and testing of the outputs from the analysis and design phases (Allen, 2006). It involved creating and organising the learning materials to be used

for the training following the blueprint created from the design phase. Preceptor and facilitator guides were developed to provide guidance and ensure the delineation of roles between preceptors and facilitators. Facilitators had the liberty to create all the relevant instructional and evaluation tools, but their guide also contained instructions for module planning and course alignment.

Implementation

The implementation phase of the ADDIE model is the operational phase (Allen, 2006). The online asynchronous learning modules began with a four-week orientation period in October 2019. Once interns completed the orientation phase, instructional modules were opened, and learning started with the history of clinical pharmacy in the United States, followed by process improvement, which spanned six weeks. Modules related to project management, leadership, and personal and interpersonal leadership lasted four weeks in the sequence listed. Each module consisted of video presentations, recommended readings, threaded discussions, assignments, and evaluations.

Evaluation

The evaluation was both formative and summative (Allen, 2006). The formative evaluation was conducted throughout and after each module. Tools used for evaluation included quizzes, discussions, and essays. Each facilitator created rubrics for assessment and shared them with participants at the beginning of each module. The summative evaluation involved evaluating the intern’s capstone project to measure learning and proficiency after the training programme.

Finally, the training was evaluated, and activities focusing on quality improvement were performed using Kirkpatrick’s four-level evaluation model, i.e., reaction, learning, behaviour, and results.

Level 1 - Reaction

Level one involved evaluating participants’ reactions to the training to gain insight into its strengths and weaknesses. Surveys were distributed at the end of the training, and participation was voluntary and anonymous.

A. A 10-item questionnaire evaluated the perception of participants of the content and relevance to their practice setting. Items were rated on a five-point Likert scale as follows: absolutely agree (5 points), agree (4 points), neither agree nor disagree (3 points), disagree (2 points), and absolutely disagree (1 point).

B. Two-open ended questions were used for participants to fully articulate their impression of the training.

C. A 5-item questionnaire using a 3-point Likert scale with open-ended questions assessed the reaction of participants to the functionality, accessibility, technical, and social presence of the online platform.

Level 2 - Learning

Level two was to assess the training in improving the knowledge and skills of the participants. The effect on learning was determined by calculating the average performance in all tests and assignments in the training module. An average of ≥ 50% was considered a passing score.

Level 3 – Behaviour

Level three evaluated the total number of students who completed the programme with a capstone project. E-mail interviews were sent to the heads of pharmacy departments at the different institutions to assess the changes and advances in clinical pharmacy practice. All qualitative data, including questionnaires and e-mail interviews, were evaluated using the inductive coding method to find common themes and categories.

Level 4 – Results

Level four evaluated the results by looking at the effects of the training on the practice site. A questionnaire was sent to the heads of pharmacy departments in the various practice settings to determine which project led to the improvement of clinical pharmacy services. Table I shows a summary of the tools used for the evaluation.

Table I: Summary of tools used for evaluation

Evaluation	Tool	Recipient
Level 1 Reaction	1. Ten-item questionnaires evaluated participants' perception of content and relevance to their practice setting	Interns
	2. Two open-ended question surveys were used for participants to fully articulate their impression on the training	
	3. Five item questionnaires assessed the participants' reaction to the online platform for functionality, accessibility, technical and social presence	
Level 2 Learning	The average performance in all tests and assignments in the training module	Interns

Evaluation	Tool	Recipient
Level 3 Behaviour	This was assessed by the total number of students who completed the programme with a capstone project.	Authors
Level 4 Results	Questionnaire and e-mail were sent to determine which project led to the improvement of clinical pharmacy services.	Heads of Pharmacy departments

Ethical considerations

This research met the criteria for IRB-exempt status as data involved the use of educational tests, surveys, and interviews (JUTH/DCS/IREC/127/XXXI/22768). Participants were encouraged to seek IRB approval if they planned to share the results of their project externally. A summary of the ADDIE framework as applied to this training is shown in Figure 1.

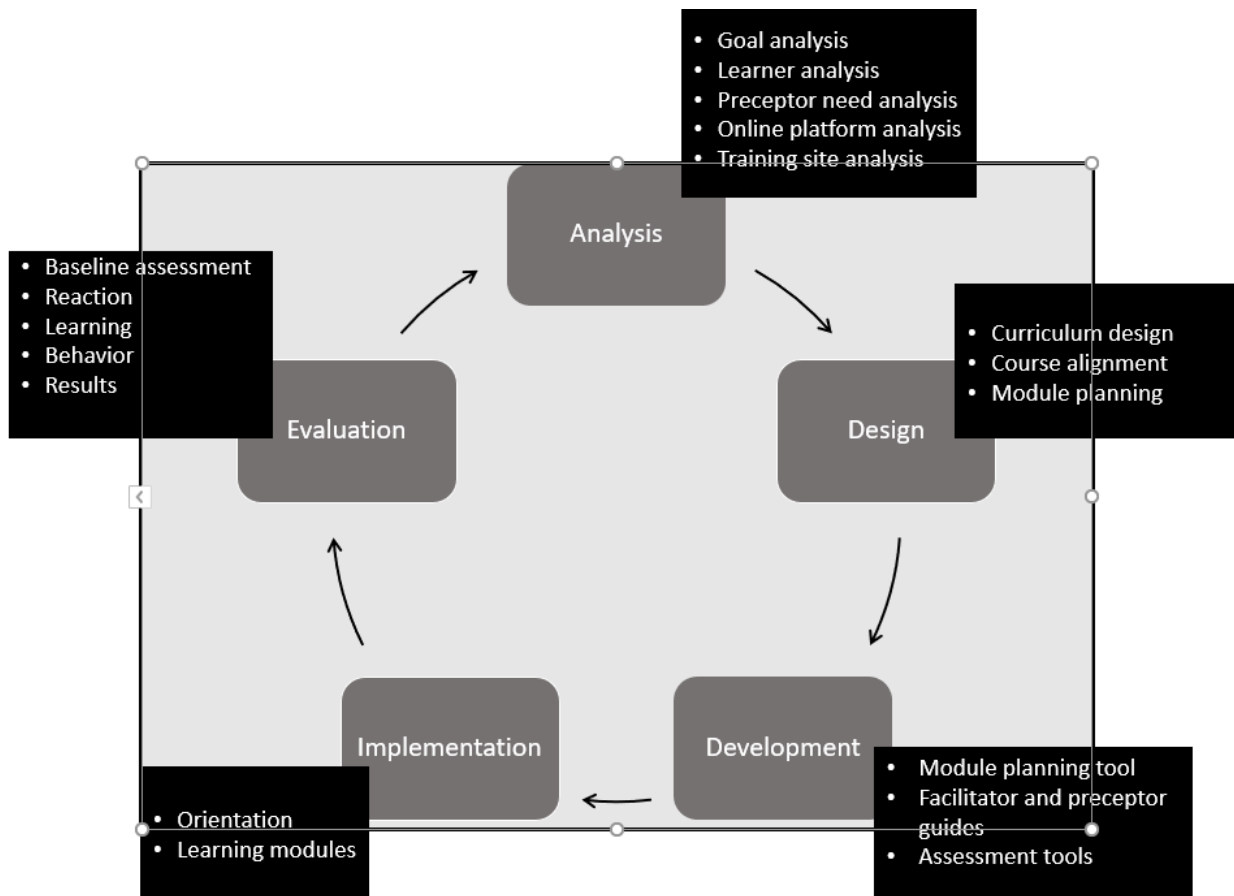


Figure 1: ADDIE framework for training design

Results

Characteristics of the participants

The mean age of the participants was 22 years, and they all had five years of pharmacy education. A learner analysis performed to assess baseline experience and attitudes showed that 4(33%) participants previously received training in leadership and 2(17%) in project management and process improvement. Most participants (92%) believed that pharmacy interns could be leaders in advancing clinical pharmacy practice. None had received any lectures on the

advancement of clinical pharmacy practice in the United States or other countries outside Nigeria. Table II shows the baseline experience of the participants.

Of the 12 enrolled participants, 8 (67%) completed the didactic training, and 5(42%) completed the didactic training and capstone projects.

Table II: Baseline characteristics of participants (N=12)

Characteristics	Frequency (%)
Has received training in leadership in the past	4 (33)
Has received training in process improvement in the past	2 (17)
Has received training in project improvement in the past	2 (17)
Has received training in personal leadership in the past	3 (25)
Has received training in interpersonal leadership in the past	2 (17)
Believe that pharmacy interns can be leaders in advancing clinical pharmacy practise.	11 (92)

Level 1 - Reaction

This level evaluated the degree to which participants found the training favourable and beneficial. Of the twelve enrolled participants, five participants completed the training with the required capstone projects and participated in the Level 1 evaluation. The mean score for the reaction to the learning modules was 3.77 (SD – 0.119). Of the five who completed the project, 4(80%) strongly agreed that the organisation of this course was effective for their learning and would recommend this training to others. Table III illustrates the reaction to the learning modules. For the open-ended questionnaire, codes were created using an inductive coding approach. Categories used to analyse the qualitative data on the reaction of the participants to the training included the most liked aspects of the training and those that needed improvement. All participants who responded to the survey reported the content and design of the training as their most liked aspect of the training.

Table III: Reaction to the didactic training (N =5)

Module title	Mean (SD)
The content of this course enhanced my knowledge in the advancement of clinical pharmacy	3.87 (1.29)
The content of this course enhanced my knowledge in process improvement	4.00 (1.62)
The content of this course enhanced my knowledge in project management	3.37 (1.89)
The content of this course enhanced my knowledge in fundamentals of leadership	3.37 (1.89)
The content of this course enhanced my knowledge in personal leadership development	4.00 (1.87)
The content of this course enhanced my knowledge in interpersonal leadership	4.00 (1.62)
The organization of this course was effective for my learning	4.00 (1.87)
I will recommend this training to others	4.62 (1.83)

Level 2 - Learning

Of the total sample, 8(67%) completed the didactic training. The average performance for the didactic training was 76% (scores ranged from 62% to 92%). Five participants (42%) wrote reflections on their learning experience and the capstone project, showing evidence of synthesis of the concepts taught in the modules and insights gained throughout the entire training.

Level 3 - Behaviour

Five of the twelve participants (42%) completed their projects, five manuscripts (42%) were written from the projects, and all participants who completed the training were interested in poster presentations and submission of manuscripts.

Level 4 - Results

Of the four heads of the pharmacy departments, three responded to the survey interview and agreed that the training was successful in expanding the role of clinical pharmacists in their department. Suggestions for improvement were the inclusion of modules on writing, grant proposal writing, navigation of the learning platform, and the provision of incentives to complete the training and tools like laptops and connectable data to reduce the dropout rate (Table IV).

Table IV : Responses of heads of department to exit interview questionnaires (N=3)

Categories	Codes	Number of respondents
Positive impacts	Initiation/expansion of clinical pharmacy services	3 (100%)
	Leadership	2 (67%)
	Problem solving	1 (33%)
	Mentorship	1 (33%)
	Expansion of internship experience	1 (33%)
Strengths of the training	Training content	3 (100%)
	Training design	3 (100%)
	Training platform	1 (33%)
Areas for improvement	Training content – research	1 (33%)
	Training content – writing	2 (67%)
	Resources for students (laptop, connectable data)	1 (33%)
	Training for preceptors	1 (33%)

Discussion

The purpose of this paper was to describe the process and experience of training Nigerian intern pharmacists in leadership and clinical pharmacy advancement. To the authors' knowledge, this report is the first on the use of the curricular space of the internship experience in Nigeria to provide formal training on leadership.

There were several challenges and successes in this preliminary implementation of the programme. The primary goal of the training, which was the development of projects that advanced the practice of clinical pharmacy in Nigeria, was lower than expected, with only five out of the twelve (42%) participants completing the required projects. This finding could be attributed to the occurrence of the COVID-19 pandemic, which struck globally in the sixth month of the training, coinciding with the start of the participants' project implementation. The pandemic resulted in movement restrictions that temporarily affected the ability of interns to continue work at their practice sites and limited direct patient contact upon resumption of work. It also prevented on-site preceptors from providing adequate supervision of the project because the focus and assigned tasks became adapted to meet the more pertinent demands of the pandemic. Other reasons for the poor completion rate include the lack of incentives to complete the programme in a setting where interns had competing needs and responsibilities, inadequate support from some of the training sites, and financial limitations as interns had to source their Wi-Fi and internet services individually. The favourable responses of the participants in the Kirkpatrick Level 1 evaluation (reaction), the demonstrated learning seen in the Level 2 evaluation (learning), the completed capstone projects seen in the Level 3 evaluation (behaviour), and the responses of the heads of departments to exit interview questions (Level 4 evaluation - results) demonstrate the feasibility and the practical potential of this training.

The approach of the ADDIE model is both descriptive and prescriptive (Branch, 2014). This paper describes each step of the planning and implementation of the training programme, while the training evaluation provides insight into the next steps. The use of the ADDIE model of instructional design provided structured guidance with the flexibility to adjust learning strategies as situations changed (Allen, 2006), which was particularly useful in the advent of the pandemic that altered the plans for the various projects. In this training, the ADDIE model displayed some features previously noted to lead to successful training (Reiser & Dempsey, 2018), including a learner-centred curriculum and learning activities, a goal-oriented process of instructional design, an exhibition of concrete and meaningful actions by the learner, and the use of specific learning outcome indicators. The front-heavy nature of the ADDIE model also allowed the coordinators of the programme to do most of the work at the beginning and to adapt teaching strategies as situations changed.

The first module, which was on the history of clinical pharmacy in the United States, was foundational for this training, providing insight into the historical, present, and future functional roles of clinical pharmacists in the

United States. The inclusion of process improvement and project management in the curriculum was based on the working definition of leadership chosen for this project. Therefore, these modules provided a comprehension of how to appropriately determine the challenges and potentials in patient care and medication use processes, along with the skills to design fitting solutions.

Kirkpatrick's method of training evaluation is simple but comprehensive, with a distinct structure to break down complex subjects into manageable levels. It provided insights into learners' satisfaction, learning measures, changes in behaviours, and the impact of the training on practice sites. Historically, the Kirkpatrick model places reaction to training as the lowest form of learning, while changes in behaviours and impact on the organisation are at a higher level of learning (Kirkpatrick & Kirkpatrick, 2006). This project made levels 3 and 4 its primary goal, which may have influenced the training outcomes. One of the project's strengths is that it measured up to level 4, which is typically difficult to evaluate and often not performed in most training. It is noteworthy that Level 4 evaluation may be considered as a surrogate marker of results, as the authors did not have a feasible alternative method to assess outcomes.

Conclusion

In summary, this paper has more practical than academic applications, and the project provides a proof of concept, corroborating the usefulness of the ADDIE model of instructional design for planning and executing training on leadership for pharmacy interns in Nigeria. One notable attribute of this training is the involvement of international collaborators who volunteered their time and provided training with minimal financial and personal time burden. With the recent COVID-19 pandemic, it has become imperative that pharmacy educators involved in Nigerian and international education develop systematic and effective methods to provide training at minimal financial and labour costs. Future projects should include continued training in leadership, an increased number of trainees, and modifications and improvements made from lessons learned from this introductory experience.

Author contributions

UN and CNS conceptualised the research idea; JM read and revised the manuscript. All authors approved the final version of the manuscript.

Conflict of interest

The authors declare that they have no competing interests.

References

- Accreditation Council for Pharmacy Education. (2015). Accreditation standards and key elements for the professional program in pharmacy leading to the Doctor of Pharmacy degree ("Standards 2016"). Chicago, IL. <https://www.acpe-accredit.org/pdf/Standards2016FINAL.pdf>
- Allen, W. C. (2006). Overview and Evolution of the ADDIE Training System. *Advances in Developing Human Resources*, 8(4), 430–441. <https://doi.org/10.1177/1523422306292942>
- Almomen, R. , Kaufman, D. , Alotaibi, H. , Al-Rowais, N. , Albeik, M. and Albattal, S. (2016) Applying the ADDIE— Analysis, Design, Development, Implementation and Evaluation—Instructional Design Model to Continuing Professional Development for Primary Care Physicians in Saudi Arabia. *International Journal of Clinical Medicine*, 7, 538-546. <http://dx.doi.org/10.4236/ijcm.2016.78059>
- Auta, A., Strickland-Hodge, B., & Maz, J. (2016). Challenges to clinical pharmacy practice in Nigerian hospitals: a qualitative exploration of stakeholders' views. *Journal of evaluation in clinical practice*, 22(5), 699–706. <https://doi.org/10.1111/jep.12520>
- Battles J. B. (2006). Improving patient safety by instructional systems design. *Quality & safety in health care*, 15 Suppl 1(Suppl 1), i25–i29. <https://doi.org/10.1136/qshc.2005.015917>
- Branch, R.M. (2014). Instructional design: The Addie approach. Springer
- Brittain, K., Spies, A., & Worrall, C. (2020). Leader Academy: A layered approach to learning leadership. *Currents in pharmacy teaching & learning*, 12(3), 326–330. <https://doi.org/10.1016/j.cptl.2019.12.012>
- Brown, B. (2018). Dare to lead: Brave work, tough conversations, whole hearts. New York: Random House Large Print.
- Kerr, R. A., Beck, D. E., Doss, J., Draugalis, J. R., Huang, E., Irwin, A., Patel, A., Raehl, C. L., Reed, B., Speedie, M. K., Maine, L. L., & Athay, J. (2009). Building a sustainable system of leadership development for pharmacy: report of the 2008-09 Argus Commission. *American journal of pharmaceutical education*, 73 Suppl(Suppl), S5. <https://doi.org/10.5688/aj7308s05>
- Kirkpatrick, D., & Kirkpatrick, J. (2006). Evaluating Training Programs: The Four Levels. Berrett-Koehler Publishers. <https://books.google.com.lb/books?id=BJ4QCmvP5rcC>
- Medina, M. S., Plaza, C. M., Stowe, C. D., Robinson, E. T., DeLander, G., Beck, D. E., Melchert, R. B., Supernaw, R. B., Roche, V. F., Gleason, B. L., Strong, M. N., Bain, A., Meyer, G. E., Dong, B. J., Rochon, J., & Johnston, P. (2013). Center for the Advancement of Pharmacy Education 2013 educational outcomes. *American journal of pharmaceutical education*, 77(8), 162. <https://doi.org/10.5688/ajpe778162>
- National Universities Commission. (2007). The National Universities Commission. Retrieved July 25, 2022, from <https://www.nuc.edu.ng/>
- Pharmacists Council of Nigeria. PCN's Internship Training Programme for Pharmacy Graduates in Nigeria. Revised ed. Abuja: PCN.EdT.005; 2014. [https://www.pcn.gov.ng/product/internship-training\[1\]programme](https://www.pcn.gov.ng/product/internship-training[1]programme). Accessed 22 June 2022
- Pittenger, A. L., Janke, K. K., & Bumgardner, M. A. (2009). An online elective course for undergraduate students on common prescription medications. *American journal of pharmaceutical education*, 73(4), 69. <https://doi.org/10.5688/aj730469>
- Reiser, R. A., & Dempsey, J. V. (2017). Trends and Issues in Instructional Design and Technology. Pearson. <https://books.google.com.lb/books?id=zOcyvgAACAAJ>
- Udoh, A., Akpan, M., Ibrahim, U. I., Lawal, B. K., Labaran, K. S., Ndem, E., Amorha, K., Matuluko, A., Tikare, O., Ohabunwa, U., & Kpokiri, E. (2021). Clinical pharmacy services provided in public sector hospitals in Nigeria: a national survey. *The International journal of pharmacy practice*, 29(5), 471–479. <https://doi.org/10.1093/ijpp/riab046>